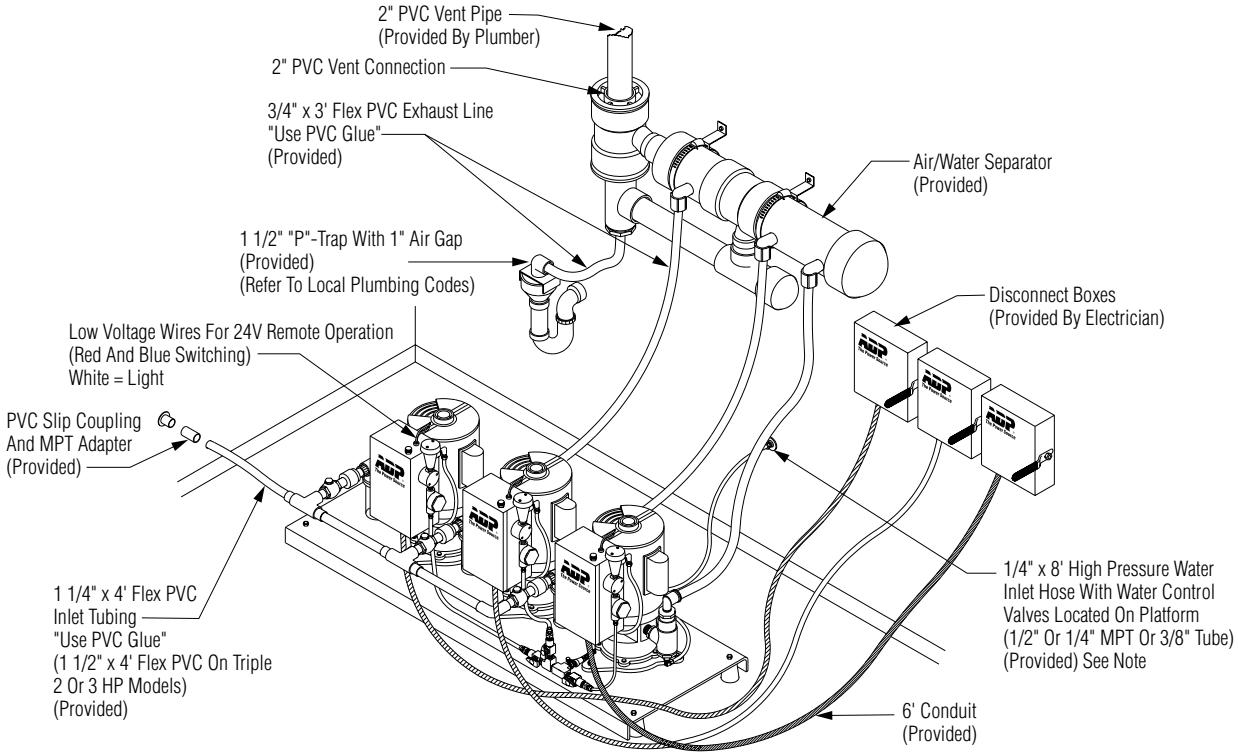
Installation & Operation
Triple Vacuum System



NOTE: Some Local Codes Require A Reduced Pressure (RP) Backflow Preventor On The Incoming Water Line. (Not Provided)
MODEL SHOWN: AVU10RR

Description

Apollo Dental Products Vacuum Systems have been tested and approved by various regulatory test agencies. The following list contains ADP File Numbers that may be helpful if questions arise regarding installation inspections.

Underwriter's Laboratories (UL) (cUL) ..... File Number: MH13627
U.S. Food and Drug Administration (FDA) ..... File Number: 2937927
City of Los Angeles Mechanical Test Labs ..... File Number M880066

This dental vacuum system should only be installed by qualified personnel. Should any questions arise during the installation, call Apollo Technical Support between the hours of 6:00 a.m. to 4:00 p.m. (Pacific Standard Time).

Unpacking The System

Place the Vacuum System in a clean, dry, well ventilated area, on a solid, level surface. Consider sound level and insulate as needed. Be sure that adequate ventilation is available as the Vacuum System is air-cooled. Ambient temperature in the equipment room should be within the temperature range of 40 degrees Fahrenheit (4^0 C) minimum to 100 degrees Fahrenheit (38^0 C) maximum.
Do Not Allow The Vacuum To Freeze.

1. Remove the cardboard from the shipping platform.
2. Inspect pump for freight damage and confirm that the Pump Installation Kit is in the box.
3. Remove the pump from the shipping platform.

Triple Vacuum Specification Table

Vacuum Model	Max. Users	Width	Depth	Height	Weight (Shipping)	Total Horsepower	Voltage	Amps (Per Pump)	Hertz	Breaker Size (One Per Pump)	Total Water* Consumption (GPM)	Vacuum Inlet Connection (PVC Slip)	Vacuum Drain Connection (PVC Slip)	Exhaust Separator Vent Link	Fresh Water Connection (NPT)	Dispos-A-Bowl Replacement 3 Needed Per System
AVG10RFX / AVU10RFX	8	99 cm.	46 cm.	41 cm.	116 kg.	3	220	7.9	50	20	1.5	32 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60001
AVG10RX / AVU10RX	8	39 in.	18 in.	16 in.	255 lb.	3	208-230	8.1	60	20	1.5	1 1/4 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60001
AVB10RFX	7	99 cm.	46 cm.	41 cm.	180 kg.	3	220	7.9	50	20	1.5	32 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60001
AVB10RX	7	39 in.	18 in.	16 in.	261 lb.	3	208-230	8.1	60	20	1.5	1 1/4 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60001
AVG15RFX / AVU15RFX	11	99 cm.	46 cm.	46 cm.	124 kg.	4 1/2	220	10.6	50	20	1.5	32 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60001
AVG15RX / AVU15RX	11	39 in.	18 in.	18 in.	273 lb.	4 1/2	208-230	11	60	20	1.5	1 1/4 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60001
AVB15RFX	10	99 cm.	46 cm.	46 cm.	125 kg.	4 1/2	220	10.6	50	20	1.5	32 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60001
AVB15RX	10	39 in.	18 in.	18 in.	276 lb.	4 1/2	208-230	11	60	20	1.5	1 1/4 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60001
AVB20RFX	12	102 cm.	46 cm.	53 cm.	137 kg.	6	220	13.4	50	20	1.5	32 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60001
AVB20RX	12	40 in.	18 in.	19 in.	303 lb.	6	208-230	13.4	60	20	1.5	1 1/4 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60001
AVG20RFX / AVU20RFX	14	102 cm.	46 cm.	48 cm.	139 kg.	6	220	13.4	50	20	1.5	38 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60011
AVG20RX / AVU20RX	14	40 in.	18 in.	19 in.	306 lb.	6	208-230	13.4	60	20	1.5	1 1/2 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60011
AVG30RFX / AVU30RFX	16	102 cm.	46 cm.	53 cm.	150 kg.	9	220	14	50	30	1.5	38 mm.	19 mm.	2 in.	3/8 BSPT-F	AVA60011
AVG30RX / AVU30RX	16	40 in.	18 in.	21 in.	330 lb.	9	208-230	14	60	30	1.5	1 1/2 in.	3/4 in.	50.8 mm	1/2 or 1/4 in.	AVA60011

Options: All models are equipped with separators. To order with a water recycler*, simply replace **"X"** with **"R"**.

*Recycler models consume .19 GPM of water per pump. (.57 GPM total per triple system).

Example: Vacuum model **AVU10RX** with recycler will be read as **AVU10RR**.

Notes: Vacuum Dimensions do not include wall mounted air/water separator.
A **dedicated electrical circuit** with circuit breaker **must be provided** for **each** vacuum pump. Ambient temperature must be within the range of 40 degrees Fahrenheit minimum (4°C) to 100 degrees Fahrenheit maximum (38°C).
"AVU" is UltraVac® **"AVB"** is Classic Bronze™
"AVG" is Gold Series™ **"F"** denotes 50Hz systems

For optimum performance, use the
New StayClean™ Product Line
Exclusively by Apollo Dental Products

A. Electrical Hook-Up Requirements

Low Voltage Line (24V)

18-3 Thermostat wire from each remote control switch to each vacuum; if low voltage remote control switching is desired. **Red** and **Blue** wires are for switching, the **White** wire is for a lighted switch, paired with **Red**.

Line Voltage (60 Hz)

Three, single-phase, or 208-230 volt, 60 Hz, supply circuit with approved ground connection is required. All units are factory wired for 230 volt operation: 230 volt operation is recommended for maximum efficiency. An electrical hook-up kit, complete with high voltage switching box, switches, and pre-wired conduit is provided.

Line Voltage (50 Hz)

Three, single phase, 220 volt, 50 Hz., supply circuit with approved ground connection is required. All units are factory wired for 220 volt operation: 220 volt operation is recommended for maximum efficiency. An electrical hook-up kit, complete with high voltage switching box, switches, and pre-wired conduit is provided.

B. Plumbing Hook-Up Requirements

Water Line (Recommended)

1/2 inch (13mm) cold water supply line with shut off valve terminating in 1/2 inch (13mm) FPT.
The line must be flushed out to connection to vacuum.

IMPORTANT: Water is essential for the operation and longevity of the pump. The supply must not be restricted or interrupted during operation. Water with high mineral content may cause mineral build-up and create water starvation, leading to seal failure. A water softener and filter are recommended for this situation. (*To prevent gradual buildup, use StayClean™ Mineral Deposit Remover by Apollo Dental Products.)

Waste Line

Water drains to sewer terminating in:
Option A - Floor sink.
Option B - P-trap (provided) adapted to 3/4 inch (19mm) PVC slip connection, A 1 inch (25mm) air gap may be required by local code.

Air Vent

2 inch PVC air vent to outdoors. **It is highly recommended to vent the exhaust air to outdoors. Venting will remove moisture laden air and any nitrous oxide from scavenging units from concentrating in the motor room.**

Vacuum Line

1 1/4 inch (32mm) PVC female slip connection. 2 and 3 HP models require a 1 1/2 inch (38mm) PVC slip connection. Guidelines for the proper design of a vacuum piping system are given in the following sections.

IMPORTANT: Continuosly running sinks or cuspidors must NEVER be connected to the vacuum piping system as pump failure may result.

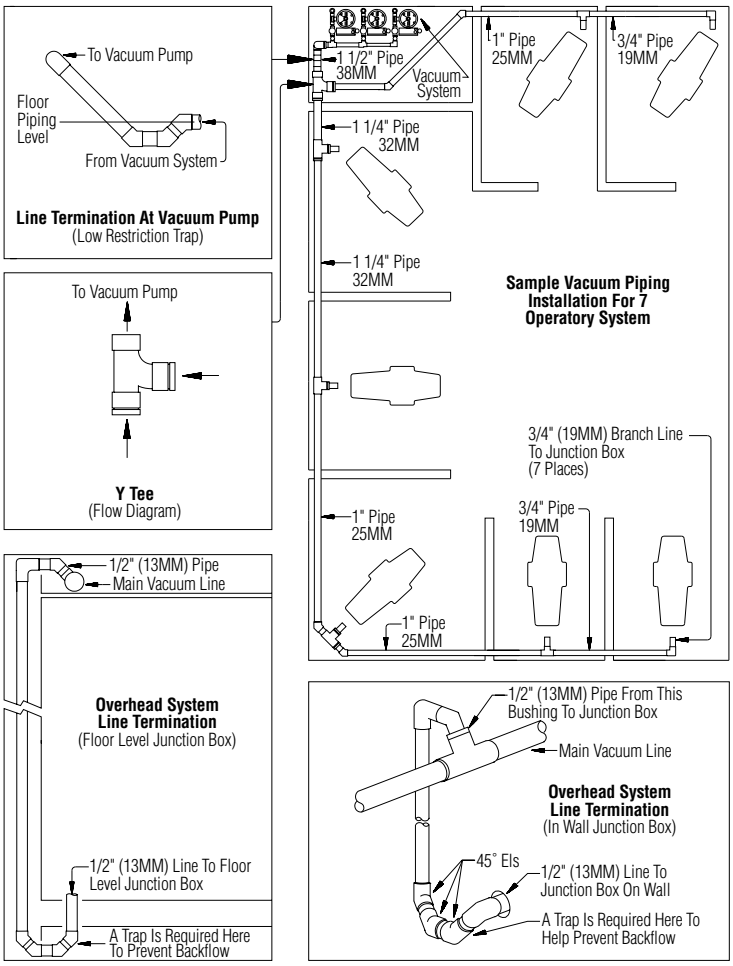
C. Vacuum Piping System Guidelines

The design of the vacuum piping can have a large effect on the efficiency and reliability of the dental vacuum system. Experience has shown that the most effective vacuum piping designs are based on the air velocity that will occur in the lines. The velocity must be high enough to entrain all liquids and sediment in the air flow so that they do not accumulate in the lines. At the same time; the velocity must not be so high as to cause unacceptable vacuum losses. The Vacuum Line Sizing chart is based on maintaining an optimum air flow velocity according to the criteria described above. Use of single size pipe will result in poor performance.

D. Vacuum Line Sizing Chart

Number Of Operatories Supplied Through Line	Pipe Diameter In Inches (MM)
1	3/4" (19)
2	1" (25)
3	1" (25)
4	1 1/4" (32)
5	1 1/4" (32)
6	1 1/2" (38)
7	1 1/2" (38)
8	1 1/2" (38)
9	2" (50)
10	2" (50)
11	2" (50)
12	2" (50)
9 - 14	2" (49)
15	2 1/2" (63.5)
16	2 1/2" (63.5)

NOTE:
Use the number of operatories being supplied, not the number of outlets within the operatories to determine line size at any given point. Branch lines to individual operatories off of the main suction line should be 3/4 inch diameter.



The vacuum lines should be supported to prevent sag and should be sloped 1/4 inch (6 mm) for every 10 feet (3m) towards the vacuum pump.

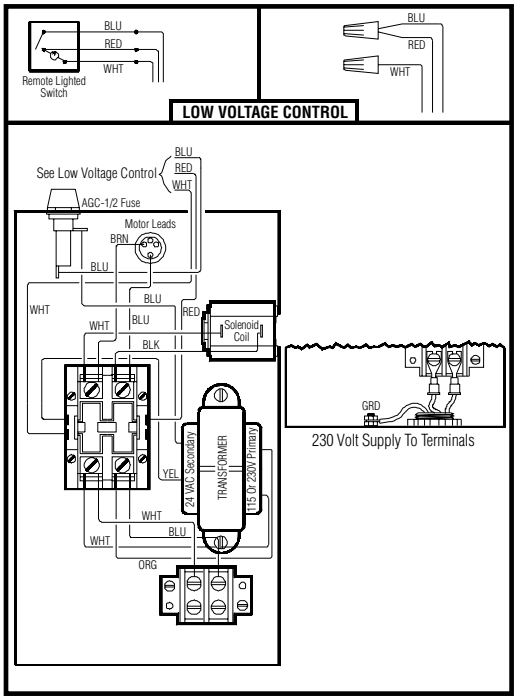
It is of primary importance to minimize 90 degree turns in the system. These will not only cause vacuum losses, but will also provide areas where sediment can accumulate. A combination of two 45 degree elbows are preferable to a 90 degree elbow. Restrictions in the line will also cause vacuum loses. Y-tee fittings should be used whenever possible.

Overhead systems require the use of the next largest size vacuum pump. Overhead systems also require a 1/2 inch (13mm) line rather than 3/4 inch (19mm) from the operatories to the main line, and special provisions to ensure that liquids do not travel back into the operatories.

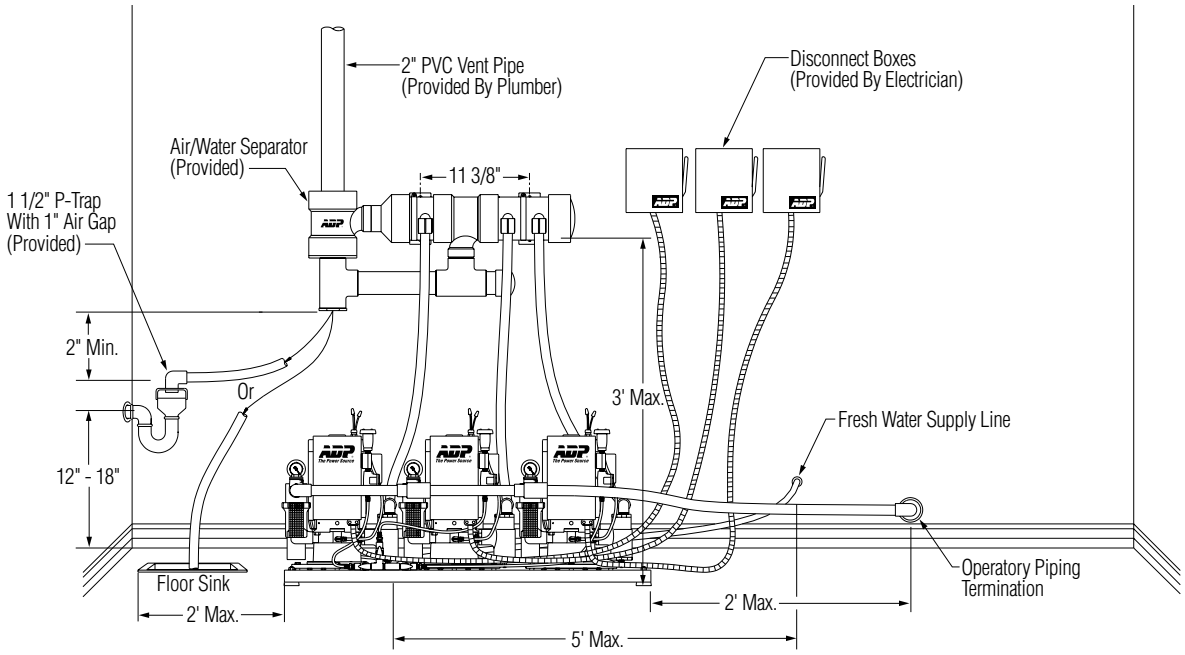
A sample vacuum piping diagram is shown. Consult Apollo Technical Support for further information regarding vacuum line sizing.

IMPORTANT: All Vacuum Systems are to be installed according to local plumbing and electrical codes. Never operate the equipment without complete and proper grounding.

Single Voltage Models



Typical Installation



E. Installing Vacuum System With Exhaust Separator

1. Place the vacuum unit on a solid level floor within 2 feet (0.6 m) of waste line P-trap or floor sink.

2. The exhaust separator comes premounted to base. Should it need to be remotely wall mounted, simply glue in provided hose using 3/4" couplings (provided). Next, remove holding pins and wall mount the separator utilizing the holes in the extension tubing as mounting holes. Remember, the separator should be located at least 2 inches (5 cm) above a waste connection and within 3 feet (1 m) of the vacuum exhaust.

3. Attach intake manifold to vacuum and glue with PVC type cement.

4. Connect operatory vacuum line to intake manifold using the provided suction hose and glue with PVC type cement.

5. Attach the provided 3/4 inch (19 mm) pump exhaust hose to inlet fittings of the exhaust separator, and glue with PVC type cement.

6. Attach provided 3/4 inch (19 mm) drain hose to P-trap (provided) or floor sink from bottom drain fitting of exhaust separator and glue with PVC type cement.

7. Install 2 inch (5 cm) PVC vent line off the top of the exhaust separator and vent to the outdoors.

8. Connect the provided brass water manifold with shut-off valve to a 1/2 inch (13 mm) water supply line.

   NOTE: It is recommended to purge at least 5 gallons of water through water line before attaching to vacuum. (Sediment in water lines of new buildings is common.)

9. Connect high voltage electrical supply lines to the pump as indicated in the electrical diagram.

10. For low voltage remote control, connect low voltage wires of corresponding color from the ADP Master Control Panel vacuum switches.

F. Initial Start-Up

1. Check that the water supply valves are **"OPEN"**.
2. Start the pumps.
3. Check exhaust tubing to ensure that water is flowing through the pumps.

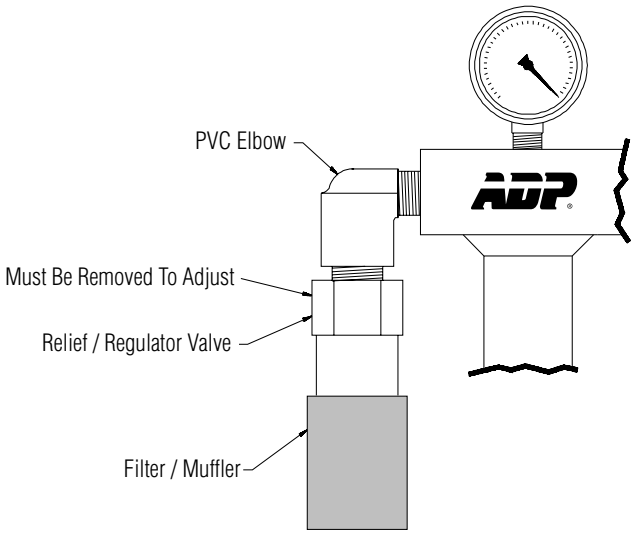
IMPORTANT: Do not run pump without full pressure water supply, or serious pump seal damage could result.

4. Check waste drain line to ensure that water is draining properly and that there are no water leaks.
5. Check vacuum gauges to ensure that each pump is functioning properly. Vacuum relief is factory preset for 10 inches Hg (34 KPa) Vacuum.
6. Store this installation manual for future reference.

G. Vacuum Level Adjustment

The Vacuum level is adjustable in the range of 8 to 13 inches Hg (27 to 44 KPa).

1. Remove the filter and valve from the PVC elbow.
2. Using a 1/4 inch nutdriver and a phillips screwdriver adjust the center mounted screw within the valve. Each full clockwise turn increases the vacuum level by approximately 2" Hg.



Maintenance

Maintenance Procedure	Daily	Weekly	Monthly	Semi-Annually	Annually
Cleanse Vacuum Piping Systems	●●●				
Clean Vacuum Pump Intake Filters		●●●			
Clean In-Operatory Strainers		●●●			
Check Vacuum Levels			●●●		
Clean And Dust Off Vacuum Pumps				●●●	
Replace Recycler Return Lines					●●●
Clean Or Replace Relief/Regulator Filters					●●●
Clean Water Inlet Strainers					●●●

Trouble-Shooting Guide

PROBLEM: Motor will not start when turned "ON".

Cause: No power to pump motor.
Remedy: 1. Check for proper voltage at pump terminal block input terminals (±10% of rated voltage). If proper voltage is not present, check circuit breaker and supply circuit.
2. If low voltage switching is being used, bypass low voltage circuit by connecting the Red and Blue wires from the top of the electrical box.
3. Check the voltage between the Blue and White low voltage wires. If it is not between 20 and 28 VAC, the fuse or the transformer may be defective, or there is a faulty connection within the box.
4. If the voltage of step 3 is within limits and the relay contacts were not closing, replace relay.

PROBLEM: Pump runs but creates insufficient "suction".

Cause: Vacuum intake filter clogged.
Remedy: 1. Clean filter, or replace with ADP Dispos-A-Bowl™.

Cause: Faulty vacuum system.
Remedy: 1. Remove the vacuum inlet line from the pump. If there is good suction at the pump, but little to none in the system, the system is clogged or contains leaks. Locate the problem and repair.

Cause: Low relief/regulator valve setting.
Remedy: 1. Adjust as illustrated in vacuum adjustment section. * Note: When adjusting be sure to block off inlet for maximum vacuum adjustment.

Cause: Inadequate water supply.
Remedy: 1. Make sure water supply valve to pump is fully "OPEN".
2. Unscrew hex cap from water inlet strainer and check for clogged filter screen. Clean as required.
3. Check for proper voltage at water solenoid coil (115 VAC ±10%). If proper voltage exists,
4. Check water regulator to see if it is plugged.

Cause: Inadequately sized pump.
Remedy: 1. Check usage chart for maximum number of simultaneous users. Upgrade if necessary.

PROBLEM: Pump runs but creates excessive vacuum.

Cause: Clogged vacuum relief filter.
Remedy: 1. Unscrew filter/muffler from valve. Clean or replace filter media and reassemble.

Cause: High relief/regulator valve setting.
Remedy: 1. Adjust as indicated in vacuum level adjustment section. *Not recommended higher than 13" HG.

PROBLEM: Pump will not run continuously.

Cause: Overheating. Thermal protection shutdown.
Remedy: 1. Check for adequate ventilation. The motor is air cooled and a ventilation fan may be required.

Cause: Circuit breaker tripping.
Remedy: 1. Check for incorrectly sized or defective circuit breaker.

Cause: Faulty relay.
Remedy: 1. Check for proper gauge size. Replace relay if contacts fail to remain closed.

Description	Part Number
Cover - Electrical Box	ECB80561
Bushing - 1" MPT x 3/4" FPT	PCV50992
Elbow - 1/4" MPT x 1/4" Poly-Flow Long	PCB50440
Elbow - Street 3/4" NPT PVC	PVC50642
Elbow - Street 1" NPT PVC	PVC51021
Filter - Relief Valve 3/4" FPT	SVA95818
Filter - Relief Valve 1" FPT	SVA95819
Fuse - 1/2 Amp	EMS10930
Fuse Holder	EMS10935
Gasket - Intake Manifold	MMS71167
Gauge - Vacuum	PGA70415
Jumper - 2 Terminal 115/230 VAC	ECC10225
Motor - 1 HP (60 Hz)	HFM30905
Motor - 1 HP (50 Hz)	HFM30915
Motor - 1 1/2 HP (60 Hz)	HFM30910
Motor - 1 1/2 HP (50 Hz)	HFM30920
Motor - 2 HP (50/60 Hz)	HFM30911
Motor - 3 HP (60 Hz)	HFM30912
Motor - 3 HP (50 Hz)	HFM30925
Nipple - 3/4" MPT Close (Brass)	PCB50475
Nipple - 3/4" Close (PVC)	PVC50520
Nipple - 1" Close (PVC)	PVC51022
O-Ring - Pump Housing, 1 & 1.5 HP	MRP70955
O-Ring - Pump Housing, 2 & 3 HP	MRP70957

Description	Part Number
Relay - 24 VAC	ETR10460
Shock Mounts - Studded Rubber	MRP70965
Seals - Shaft Seal Assembly, 1 & 1.5 HP	SVA95845
Seals - Shaft Seal Assembly, 2 & 3 HP	SVA95847
Strainer - 3/4" FPT Vacuum Inlet	PVC50705
Strainer - 1" FPT Vacuum Inlet	PVC50706
Strainer - 1/4" FPT Water	PCB50960
StayClean 64 oz. Bottle	ASC00002
StayClean (64) 1 oz. Tubes	ASC00001
StayClean Non-Foaming Cleaner (4) 64 oz.	ASC00005
Transformer - 115/220 Volt 24 VAC	ETR10500
Tubing - 3/4" PVC (19 mm)	PCT80460
Tubing - 1" PVC (25 mm)	PCT80461
Tubing - 1 1/4" PVC (32 mm)	PCT80462
Tubing - 1 1/2" PVC (38 mm)	PCT80463
Tubing - 1/4" Poly-Flow 135 PSI (6 mm)	PCT80610
Union - 3/4" Slip (PVC)	PVC50200
Valve - 1/4" FPT Anti-Siphon	PVV50595
Valve - One Way 3/4" Check	PVV50657
Valve - Relief / Regulator 3/4" MPT	PVV95980
Valve - Relief / Regulator 1" MPT	PVV85981
Valve - Solenoid 1/4" FPT 115 VAC	PVV10470
Valve - Solenoid 1/4" FPT 230 VAC	PVV10472

*To order parts, contact your authorized ADP Dealer.

Warranty Information:

- **2 Years from date of shipment on materials and workmanship for all Vacuums.**
- **3 Years on the Silicon Bronze Pump components for the Gold Series™ Vacuum.**
- **5 Years on the Stainless-Steel Pump components for the UltraVac Series® Vacuum.**

All ADP units are thoroughly inspected and tested in accordance with rigid specifications and standards. Our products are guaranteed against any defective material and workmanship from the date of shipment; provided, that the installation, operation, and maintenance is done in accordance with ADP procedures as outlined in our Installation and Maintenance Guides. Warranty cards must be returned to ADP within ten days of installation to effect warranty. No other warranties or guarantees, expressed or implied are made.

ADP's obligation under the warranty is to provide parts for the repair or, at its option, to provide the replacement product (excluding labor). All special, incidental and/or consequential damages are excluded. We will not issue credit for complete air compressors or vacuum systems without first attempting to correct the problem in the field. Written notice of breach of warranty must be given to ADP within the warranty period. The warranty does not cove damage resulting form improper installation or maintenance, accident or misuse. The warranty does not cover damage resulting from the use of cleaning, disinfecting or sterilizing chemicals and processes. The warranty does not cover vacuum failures due to hard water deposits. Failure to follow instructions provided in ADP's Installation and Maintenance Guides may void the warranty.